

Unit 1: Understanding Place Value

4th Grade Math

20 Class Meetings

Written July 2024

Essential Questions

- How does understanding place value help us read, write, and compare large numbers?
- How can addition and subtraction help us solve problems in everyday life?

Enduring Understandings with Unit Goals

EU 1: Our place value system is structured such that a digit in any place represents 10 times as much as it represents in the place to its right.

- Explain the relationship between digits in different places within a number, recognizing that each place represents ten times the value of the place to its right.
- Read and write numbers up to at least one million in standard form, word form, and expanded form, demonstrating an understanding of the place value of each digit.
- Recognize and explain patterns in the multiplication of numbers by 10, 100, and 1,000, using place value strategies to understand the results.

EU 2: Comparing numbers written in standard form uses the understanding that 1 of any unit is greater than any amount of a smaller unit.

- Compare and order multi-digit numbers using place value understanding to determine the relative sizes of numbers.
- Use symbols ($>$, $<$, $=$) to accurately compare and record comparisons between numbers in standard form.
- Arrange multi-digit numbers in ascending or descending order based on their place value understanding.
- Explain their reasoning when comparing numbers, using precise mathematical language related to place value and the relative size of numbers.

EU 3: The standard algorithms for addition and subtraction are based in the idea of needing to add like-units together and the idea that one can regroup 1 of any unit to be 10 of the next smallest unit

- Apply their understanding of place value to solve real-world problems involving addition, subtraction, and estimation with multi-digit numbers.
- Demonstrate the ability to add or subtract numbers by aligning digits according to place value, ensuring that only like-units are added or subtracted properly (e.g., ones with ones, tens with tens).
- Practice addition and subtraction algorithms to achieve fluency, performing calculations accurately and efficiently.
- Articulate the reasoning behind the addition and subtraction algorithms, using place value language to explain regrouping and the need to add or subtract like-units.

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Standards

Common Core State Standards:

- **CCSS.Math.4.NBT.A.1:** Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. For example, recognize that $700 \div 70 = 10$ by applying concepts of place value and division.
- **CCSS.Math.4.NBT.A.2:** Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.
- **CCSS.Math.4.NBT.A.3:** Use place value understanding to round multi-digit whole numbers to any place.
- **CCSS.Math.4.NBT.B.4:** Fluently add and subtract multi-digit whole numbers using the standard algorithm.
- **CCSS.Math.4.OA.A.3:** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
- **CCSS.Math.4.OA.C.5:** Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.

ISAAC Vision of the Graduate Competencies

Competency 1: Write effectively for a variety of purposes.

Competency 2: Speak to diverse audiences in an accountable manner.

Competency 3: Develop the behaviors needed to interact and contribute with others on a team.

Competency 4: Analyze and solve problems independently and collaboratively.

Competency 5: Be responsible, creative, and empathetic members of the community.

Unit Content Overview

1. Understanding Place Value

- Understand that each digit in a number has a specific value based on its position.
- Identify place values in whole numbers up to one million (e.g., ones, tens, hundreds, thousands).
- Convert between standard, word, and expanded forms.
- Recognize that each place's value is ten times the value of the place to its right.
- Understand the role of commas in large numbers (e.g., 1,000; 10,000; 100,000).
- Round numbers to the nearest ten, hundred, or thousand.
- Apply place value understanding to solve real-world problems.

2. Comparing Numbers

- Use place value to compare multi-digit numbers.
- Order numbers from least to greatest and greatest to least.
- Use comparison symbols ($>$, $<$, $=$) to record results.

Unit 1: Understanding Place Value

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- Recognize that a digit in any given place is greater than any number of digits in the place to its right.
- Solve real-world problems that require comparing and ordering numbers, using place value knowledge to justify reasoning.

3. Standard Algorithms for Addition and Subtraction

- Estimate sums and differences using rounding and compatible numbers.
- Demonstrate the ability to add numbers by aligning digits according to place value, ensuring that only like-units are added together
- Apply the standard algorithm for addition, including regrouping, by recognizing when the sum of a place value column is ten or more and carrying over to the next higher place value.
- Subtract numbers by aligning digits according to place value, ensuring that only like-units are subtracted from each other.
- Apply the standard algorithm for subtraction, including regrouping, by recognizing when a digit in a place value column is smaller than the digit being subtracted and borrowing from the next higher place value.
- Apply understanding of addition and subtraction algorithms to solve real-world problems, demonstrating the ability to select appropriate operations and strategies.
- Articulate the reasoning behind the addition and subtraction algorithms, using place value language to explain regrouping and the need to add or subtract like-units.

Vocabulary and Key Terms: place value, digit, standard form, word form, expanded form, ones, tens, hundreds, thousands, ten thousands, hundred thousands, millions, rounding, estimation, greater than ($>$), less than ($<$), equal to ($=$), ascending order, descending order, comparison, addition, subtraction, regrouping, sum, difference, algorithm, addends, minuend, subtrahend, estimate, equation

Interdisciplinary Connection:

- ELA

Daily Learning Objectives with TWPS

Students will be able to...

- Understand that each digit in a number has a specific value based on its position.
 - *How would you explain place value to someone who has never heard of it before?*
 - *Why is the digit '0' important in numbers? How does it affect the value of other digits?*
- Identify place values in whole numbers up to one million (e.g., ones, tens, hundreds, thousands).
 - *What does it mean for a digit to have a value based on its position in a number? Can you give an example?*
- Convert between standard, word, and expanded forms.
 - *How do you convert a number from standard form to word form and expanded form?*
 - *Why is it important to know all three forms?*
 - *Why is it important to read and write large numbers correctly? In what situations might this be useful?*

Unit 1: Understanding Place Value

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- Recognize that each place's value is ten times the value of the place to its right.
 - *Can you think of a situation where understanding place value would be useful outside of math class?*
- Understand the role of commas in large numbers (e.g., 1,000; 10,000; 100,000).
 - *What does a comma tell us about a number?*
- Round numbers to the nearest ten, hundred, or thousand.
 - *How can rounding numbers make calculations easier or more practical? Can you give an example?*
 - *If you had a number like 2,365, how would rounding it to different place values change its value?*
- Apply place value understanding to solve real-world problems.
 - *How might place value help you when you're shopping or keeping track of money?*
- Use place value to compare multi-digit numbers.
 - *How can you tell which of two numbers is greater just by looking at their digits?*
- Order numbers from least to greatest and greatest to least.
 - *Why is it important to compare numbers accurately?*
- Use comparison symbols ($>$, $<$, $=$) to record results.
 - *How can mistakes in comparing numbers affect your results?*
- Recognize that a digit in any given place is greater than any number of digits in the place to its right.
 - *If you change the position of digits in a number, how does it affect the value of the number? Can you provide an example?*
- Solve real-world problems that require comparing and ordering numbers, using place value knowledge to justify reasoning.
 - *How can comparing numbers help you when budgeting or planning for an event?*
- Estimate sums and differences using rounding and compatible numbers.
 - *If you were teaching someone how to compare numbers, what examples or activities would you use to help them understand?*
- Demonstrate the ability to add numbers by aligning digits according to place value, ensuring that only like-units are added together.
 - *When you add or subtract numbers, how does the place value of each digit affect the result?*
- Apply the standard algorithm for addition, including regrouping, by recognizing when the sum of a place value column is ten or more and carrying over to the next higher place value.
 - *How can you check your addition or subtraction work to make sure it's correct?*
- Subtract numbers by aligning digits according to place value, ensuring that only like-units are subtracted from each other.
 - *How do you handle regrouping (borrowing) when subtracting?*
- Apply the standard algorithm for subtraction, including regrouping, by recognizing when a digit in a place value column is smaller than the digit being subtracted and borrowing from the next higher place value.
 - *What happens if you add or subtract numbers in a different order? Does the result change?*
- Apply understanding of addition and subtraction algorithms to solve real-world problems, demonstrating the ability to select appropriate operations and strategies.

Unit 1: Understanding Place Value

4th Grade Math

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- *If you had a large number like 8,764 and you needed to subtract 2,349, what steps would you take to ensure accuracy?*
- Articulate the reasoning behind the addition and subtraction algorithms, using place value language to explain regrouping and the need to add or subtract like-units.
 - *When comparing two different methods for solving an addition or subtraction problem, how do you decide which method to use?*

Instructional Strategies/Differentiated Instruction

- Whole group instruction
- Paragraph frames and sentence starters
- Teacher modeling
- Think-write-pair-share and small-group discussions
- Graphic organizers
- Accountable talk
- Homework
- Word walls with visuals (Venn Diagrams)
- Small group instruction
- Visual exemplars with teacher and student critiques
- Text and video chunking
- Spiraling back to guiding questions
- Multiple CFUs
- Close reading with text-dependent questions

EL Differentiation Strategies

- Word Banks and Word Walls with visuals
- TWPS (Think, write, pair, share)
- Pre-reading strategies
- Culturally responsive teaching
- Explicit teacher modeling
- Key vocabulary
- Graphic organizers
- Strategic Grouping
- Non-verbal assessments

Assessments

FORMATIVE ASSESSMENTS:

- Do Now
- Academic Discourse
- Exit Slips
- Accountable Talk Discussions
- Completed notes
- Homework
- Performance Task -- "Class Party" Planning Performance Task
 - Teacher's rubric/scoring guide

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SUMMATIVE ASSESSMENTS:

- Quiz: Place Value, Comparing Numbers, Adding and Subtracting (EU1, EU2, and EU3)
- IAB
- Unit Task: “Class Party” Planning Performance Task (EU1, EU2 and EU3)

Unit Task

Unit Task Name: “Class Party” Planning Performance Task

- **Description:** The class is planning a party, and the students need to manage the budget and make decisions about how many supplies to buy. Each student will be given a budget of \$500 and will have to buy certain supplies (3 packs of napkins, each costing \$24.95, 5 boxes of pencils, each costing \$7.89, and 2 bags of candy, each costing \$12.75). Students will have to compute the total cost for each item and then compare costs. Each student will use their knowledge of place value, comparing numbers, and addition and subtraction to help with the planning.

Evaluation: Teacher’s Scoring Guide

Unit Resources

- Google Classroom
- Edulastic
- Engageny
- Math In Focus
- Math Antics
- State Common Core Standards Transition Tasks
- Match Fishtank
- Worksheets
- Individual White boards
- Interactive notebook
- Laptops
- SBAC Prep Online